Claims

[c1]   What is claimed is:

1. A method of diffusion weighted MR imaging comprising the steps of:

for each echo train, splitting MR data acquisition into non-parallel odd and even echo acquisition blades;

for each echo train, rotating the odd and even acquisition blades of data acquisition about an origin point with respect to a previous acquisition; and

combining data collected from each odd and even data acquisition blades into a composite set of MR data for reconstruction.

[c2]   2. The method of claim 1 comprising the step of collecting each blade of MR data with a separate transmit and receive coil.

[c3]   3. The method of claim 2 further comprising the step of phase correcting selected MR data to remove spatially varying phase differences between refocusing pulses applied to induce each echo train and the receive coil.

[c4]   4. The method of claim 3 further comprising the step of phase correcting the collected MR data to remove spa-

tially varying differences resulting from application of diffusion weighting gradients.

[c5]   5. The method of claim 1 wherein the origin point is positioned in a center of k-space and the odd and even acquisition blades of a given acquisition are rotated with respect to one another.

[c6]   6. The method of claim 1 wherein each blade is similarly sized.

[c7]   7. The method of claim 1 wherein each blade has a width equal to one-half a width of a composite blade of the two separate blades of data acquisition.

[c8]   8. The method of claim 1 further comprising the step of applying a fast spin echo-diffusion weighted imaging pulse sequence to acquire each blade of data acquisition.

[c9]   9. An MRI apparatus comprising:
a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and
a computer programmed to:
segment acquisition of each echo train into an odd sec-

tion and an even section, wherein each odd and even section extends through an origin point;

acquire a segment of MR data;

rotate each segmented acquisition a prescribed interval about the origin point for each subsequent acquisition;

combine MR data from corresponding odd and even sections into a composite set of MR data; and

reconstruct an image from the composite set.

[c10]   10. The MRI apparatus of claim 9 wherein the computer is further programmed to phase correct the MR data for each odd and even section.

[c11]   11. The MRI apparatus of claim 9 wherein the computer is further programmed to imitate a fast spin echo-diffusion weighted imaging pulse sequence to acquire data for each odd and even section.

[c12]   12. The MRI apparatus of claim 9 wherein the origin point includes a center of k-space.

[c13]   13. The MRI apparatus of claim 12 wherein each section includes a rectangular strip of k-space extending through the center of k-space.

[c14]   14. The MRI apparatus of claim 9 further comprising a transmit RF coil configured to transmit an RF pulse toward a subject and a receive RF coil configured to receive

signals from the subject for processing into MR data suitable for image reconstruction.

[c15]   15. The MRI apparatus of claim 9 wherein each section is similarly sized.

[c16]   16. A computer readable storage medium having stored thereon a computer program comprising instructions which when executed by a computer cause the computer to:

for each echo train, segment data acquisition into an odd data acquisition and even data acquisition;

associate a strip of k-space extending through a center of k-space for each data acquisition;

rotate the strip of k-space for the odd data acquisition and the even data acquisition for each subsequent echo train; and

combine parallel strips of data collected for each odd and even acquisition into a composite set of MR data for image reconstruction.

[c17]   17. The computer readable storage medium of claim 16 wherein the set of instructions further causes the computer to phase correct each strip of k-space data.

[c18]   18. The computer readable storage medium of claim 16 wherein each strip of k-space includes multiple k-space

lines.

[c19]   19. The computer readable storage medium of claim 16 wherein each odd acquisition includes a strip of k-space spaced 90 degrees from that for each strip of an even acquisition.

[c20]   20. The computer readable storage medium of claim 16 wherein the set of instructions further causes the computer to initiate a fast spin echo imaging sequence to acquire each strip of k-space data.